

## REMARKS

### Claims 13 & 21

The indication that dependent claims 13 and 21 would be allowable if placed in independent form is acknowledged with appreciation.

Claim 13 has been rewritten in independent form with the deletion of the limitations of dependent intermediate claim 8 which (since it was rejected) is assumed and believed to not have contributed to the basis on which original claim 13 was deemed to be allowable if rewritten in independent form. Accordingly, while amended independent claim 13 is broader than original dependent claim 13, it is nevertheless believed to be allowable and define patentable subject matter over the cited references for at least the reasons for which original claims 13 and 21 were deemed to do so.

Applicant reserves the right in response to the next Office Action to place dependent claim 21 in independent form in the event independent claim 14 on which it is dependent is not found to be allowable in view of the amendment of claim 14 and the following remarks in regard thereto.

### Claim 1

Claim 1 has been amended to better distinguish applicant's invention over the cited references. As amended, claim 1 defines a carburetor comprising a body having a mixing passage, a throttle valve assembly movable in the mixing passage between idle and wide open positions and having a rotatable polymeric shaft journaled in integral bores in the carburetor body, a separate polymeric cam body connected to the shaft for rotation in unison

therewith and configured to be connected to an actuator wire, a valve head carried by the shaft for rotation in unison therewith, and at least one stop carried by the body and engageable with the cam to limit rotation of the valve assembly to at least one of an idle and a wide open throttle position of the valve head.

This specific construction and arrangement as defined by amended claim 1 has the significant practical advantages of the polymeric shaft and cam body elastically or resiliently permitting overtravel of the throttle actuator wire when the throttle is moved to either or both of the idle position and wide open throttle position, thereby significantly increasing part tolerances, reducing manufacturing and assembly costs, providing significantly improved sealing between the valve head and mixing passage in the idle position, enabling the use of many different cam body configurations in conjunction with a common shaft and valve head and often a common carburetor body and mixing passage thereby greatly decreasing the inventory of parts required to mass produce carburetors for a wide variety of different engine applications, improved sealing between the rotatable polymeric shaft and the carburetor body, significantly improved abrasion resistance or wear life between both the shaft and the pin of the valve assembly and the metallic carburetor body particularly the common commercial high silicon aluminum carburetor body, improved ease of assembly of the component parts, and significantly reduced manufacturing and assembly costs.

### **The Rejection**

Original claim 1 was rejected only under §103 over the admitted prior art in view of the Shishido and Tuckey et al references.

### **Admitted Prior Art**

The admitted prior art simply discloses a carburetor having a choke valve with a plastic one-piece shaft with an integral handle which may be grasped by a user and rotated to move the choke valve between its opened and closed positions. A metal valve disc may be press-fitted into a slot formed through the choke shaft.

Skilled persons recognize that the requirements for a commercially acceptable manually actuated choke valve are significantly different and far less demanding or stringent than those for a throttle valve with a cam rotated by an actuator wire to move the throttle valve between idle and wide open positions.

### **Shishido U.S. 3,852,379**

The '379 reference discloses a complex carburetor 10 for a combustion engine having both a main combustion chamber and an auxiliary combustion chamber for each cylinder. The carburetor 10 has primary 12, secondary 13, and auxiliary 14 fuel and air mixing passages each with a venturi and each with a separate throttle valve 18, 20, 22 fixed on a separate shaft 19, 21, 23 which are parallel to each other. A throttle cable 39 is attached to an actuator member 25 constructed of two sheet metal stampings 26 and 27 fixed together and journaled for rotation of a separate stationary hub 24 encircling the throttle shaft 19 and

fixed to the metal body of in the carburetor. The actuator member 25 is not mounted on the throttle shaft 19 and hence the linear forces produced by travel and overtravel of the throttle cable 39 do not place a bending load on the throttle shaft because the actuator member 25 is mounted on the stationary hub 24 and not on the shaft 19 (Col 3, Lines 24-28). All three throttle shafts are operably connected by a complex arrangement of levers, cams and springs to synchronize and control opening of one throttle shaft relative to another as described in detail in Col 5, Line 1 through Col 6, Line 28.

**Tuckey et al U.S. Patent 4,139,580**

The Tuckey '580 reference discloses in Figs. 1-5, a first form having a metal carburetor body 20, and in Figs. 6-9, a second form having a plastic carburetor body 120. Both forms have a throttle valve with a separate metal shaft 26, 132 to which a separate metal valve disc 60, 134 is removably attached by a threaded screw, and a metal operating lever 32, 140 is attached to the shaft and engageable with a stop screw 36, 144 carried by the body.

Both forms have a plastic one-piece integral choke shaft 22, 126, valve plate 52, 128, and a manual actuator lever 24 or tab 146. The polymeric shaft 22, 140 is received in split bores formed between the carburetor body 20, 120 and in a separate retainer sleeve 50, 122 telescopically received in the body and forming part of the mixing passage. Due to the one-piece construction of the choke shaft, valve plate and manual actuator lever 10, it is necessary to have the split bores and a separate sleeve 50, 122 to journal the one-piece plastic choke valve assembly in the carburetor.

**Claim 1 is Patentable**

The proposed combination of three references does not disclose, suggest or teach applicant's specific concept, construction and arrangement as defined by amended claim 1 nor its significant practical advantages all of which are a part of the subject matter as a whole which must be considered when applying the §103 non-obviousness provision. Whether considered alone or in combination, none of these references disclose, suggest or teach applicant's specific concept, construction and arrangement as defined by amended claim 1 of a carburetor having a metal body with a mixing passage and integral bores, a throttle valve assembly having a polymeric shaft rotatable in the integral bores in the carburetor body, a separate valve head in the passage and carried by the shaft for rotation in unison therewith, a polymeric cam body connected to the shaft for rotation in unison therewith and engageable with at least one stop carried by the body to limit rotation of the valve assembly to at least one of its idle and wide open throttle position, and the cam being configured to be connected to an actuator wire for movement of the throttle shaft and valve head between idle and wide open positions. Furthermore, none of these references, whether considered alone or in combination, disclose, suggest or teach the significant practical advantages noted above which are achieved by this specific construction and arrangement.

Indeed, the Shishido reference teaches away from applicant's invention by disclosing a carburetor having a throttle valve assembly with all metal components and a lever or actuator member connected to a cable and rotatably mounted on the carburetor body to prevent the bending load produced by movement of the throttle cable from being transmitted to the throttle shaft.

The admitted prior art and the Tuckey reference teach away from applicant's invention as defined by amended claim 1 because they disclose a manually actuated choke valve with a plastic one-piece shaft with an integral handle which is manually grasped by a user and rotated to open and close the choke valve. Tuckey further teaches away from applicant's invention by disclosing the choke valve having a one-piece integral shaft, handle and valve head which requires a configuration having split bores produced by two separate pieces to journal and assemble the choke valve in the carburetor body.

Furthermore, the proposed combination of references does not disclose, suggest or teach which of their numerous elements should be discarded and which selected, rearranged and recombined with elements not disclosed in the prior art to achieve applicant's specific construction and arrangement as defined by amended claim 1 and its significant practical advantages. Furthermore, for these same reasons, the references, whether considered alone or in combination, do not provide any motivation, suggestion or teaching to combine them or as to how they should be combined to achieve applicant's specific construction and arrangement and its significant practical advantages as defined by amended claim 1.

Accordingly, amended claim 1 defines patentable subject matter under §103 for at least these reasons.

#### **Claim 14**

Claim 14 defines a throttle valve assembly comprising a carburetor body with a mixing passage, a polymeric shaft rotatably carried by the carburetor body and movable

axially relative to the mixing passage and having a slot therethrough between its ends, a throttle cam body connected to the shaft for rotation in unison therewith and engageable with at least one stop carried by the carburetor body to limit rotation of the throttle valve assembly, a valve head carried by the shaft for rotation in unison therewith, received in the mixing passage and disposed in the slot, and the length of the slot being greater than the width of the portion of the valve head received in the slot and greater than the width of the mixing passage at the location of the shaft in the mixing passage so that the shaft is movable axially relative to both the valve head and the mixing passage to center the valve head in the mixing passage.

This specific construction and arrangement has the significant practical advantages noted above plus providing a construction in which the valve head is self-centering in the passage both upon assembly and throughout the useful life of the carburetor. This self-centering feature permits the use of wider tolerances on the various component parts, and significantly reduces the cost to manufacture and assemble the components of the valve. In the carburetor, this valve assembly accommodates axial movement and shifting of the throttle shaft and the cam body attached thereto throughout the service life of the carburetor.

#### **Claim 14 is Patentable**

Neither the admitted prior art nor the cited references, whether considered alone or in the various proposed combinations, disclose, suggest or teach the specific concept, construction and arrangement defined by amended claim 14 nor its significant

practical advantages, all of which are part of the subject matter as a whole to be considered in determining patentability under §103. None of the references disclose, suggest or teach this specific concept nor its construction and arrangement of a plastic shaft journaled for rotation and axial movement in a carburetor body with a slot through the shaft having a length greater than the width of the valve head received in the slot to provide automatic self-centering of the head in the passage both upon initial assembly and throughout the in-service life of the carburetor. In short, the cited references do not disclose, suggest or teach this concept, its significant practical advantages nor any structure producing this self-centering of the valve head much less applicant's specific construction and arrangement as defined by amended claim 14 for doing so.

Furthermore, for at least these same reasons, there is no motivation, suggestion or teaching to combine these references and even if combined they would not disclose the specific construction and arrangement defined by amended claim 14. Accordingly, independent claim 14 defines patentable subject matter for at least these reasons.

#### **Claims 2-12**

Each of claims 2-12 is ultimately dependent on claim 1 and hence defines patentable subject matter for at least the reasons for which claim 1 does so.

Dependent claim 4 further defines the valve head as having stops disposed on opposite sides of the shaft with the distance between the stops being greater than the diameter of the shaft. This specific construction permits the valve head to shift laterally or



transversely of the shaft to center the valve head in the passageway.

Dependent claims 5 and 6 define the valve head as being generally circular and the slot in the shaft as having a length greater than the diameter of the valve head so that the valve head can shift axially relative to the shaft. Claim 7 defines the slot as having a length greater than the width of the portion of the valve head received in the slot and greater than the width of the mixing passage at the location where the shaft extends across the mixing passage.

The construction of claims 5-7 enable the valve head to shift axially relative to the shaft to center the valve head in the mixing passage.

Claim 9-11 defines various constructions, arrangements and configurations of the shaft and the cam body to attach the cam body to the shaft.

None of the references, whether considered alone or in combination, disclose, suggest or teach skilled persons the carburetor construction and arrangement defined by each of claims 4-7 and 9-11 and hence these claims define patentable subject matter for at least these additional reasons.

#### **Claims 15-22**

Each of claims 15-22 is ultimately dependent on independent claim 14 and hence defines patentable subject matter for at least the foregoing reasons for which claim 14 does so.

Dependent claim 17 further defines the slot as spanning the mixing passage, the shaft as being journaled for rotation at least in part beyond each end of the slot, a spring

received over the shaft between the cam body and the carburetor body, and a retainer received on the shaft adjacent an end of the shaft distal from the cam body and adjacent the carburetor body.

Each of dependent claims 18, 19, 21 and 22 further define specific constructions of the shaft and the cam body which attach the cam body to the shaft for rotation in unison therewith.

The specific construction and arrangement of the valve assembly defined by each of claims 17-19, 21 and 22 is not disclosed, suggested or taught to skilled persons by any of the cited references, whether considered alone or in combination and hence each of these claims defines patentable subject matter under §103 for at least these additional reasons.

#### **New Claims 23 and 24**

New independent claim 23 defines a valve assembly with a carburetor body having a mixing passage, and a pair of co-axial integral bores extending through one piece of the body with their axis transverse to the axis of the mixing passage, a plastic one-piece valve shaft journaled for rotation in the bores and axially movable relative to the carburetor body and having a slot through the shaft, a valve head received in the passage and disposed in the slot, and the axial length of the slot being greater than the width of the portion of the valve head disposed in the slot and greater than the width of the mixing passage at the location of the shaft in the mixing passage so that the shaft is movable axially relative to both the valve head and the mixing passage to center the valve head in the mixing passage.

While claim 23 is broader in some respects than claim 14, it is believed to define patentable subject matter for at least the foregoing reasons for which claim 14 does so.

New claim 24 is dependent on claim 23 and further defines the valve head as having at least two stops with at least one stop on each of opposed sides of the shaft with the distance between stops on opposed sides of the shaft being greater than the portion of the shaft received between the opposed stops so that the valve head can shift laterally within predetermined limits to the shaft to center the valve head in the passage when the valve head is in a substantially closed position.

The specific construction defined by new claim 24 is not disclosed, suggested or taught to skilled persons by any of the cited references, whether considered alone or in combination, and hence new claim 24 defines patentable subject matter for at least this additional reason.

### **Conclusion**

As amended, each of claims 1-22, as well as new claims 23 and 24, are believed to define patentable subject matter under §103 for the foregoing reasons and to be in a condition for allowance. Therefore, reconsideration and allowance of amended claims 1-22, as well as new claims 23 and 24, is respectfully requested.

If, after considering this Response, the Examiner is of the view that any of claims 1-24 is not in a condition for allowance, a telephone interview is requested with applicant's undersigned attorney, William Francis, so that immediate consideration can be

given to any further amendments suggested by the Examiner or otherwise needed to place all the claims in a condition for allowance. The Examiner is asked to initiate this telephone interview by calling William Francis at (248) 689-3500 any workday Monday through Friday between 9:00 A.M. and 5:00 P.M.

A Marked-Up Copy showing the amendments made to claims 1-22 is enclosed.

A check in the amount of \$120.00 is enclosed to cover the additional claim fees. If the amount of this check is incorrect, please charge any claim fee deficiencies or credit any excess to our Deposit Account No. 50-0852.

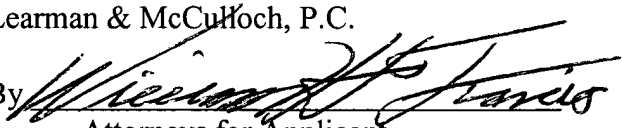
Respectfully submitted,

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Enclosures

By

  
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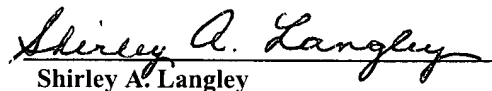
IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: **Paul J. Dow**  
Serial No. 09/702,470  
Filed: October 31, 2000  
For: Carburetor Valve Assembly  
Group Art Unit: 1724  
Examiner: Examiner Richard L. Chiesa  
In reply to: Examiner's Letter of December 26, 2001

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**CERTIFICATE OF MAILING**

Date of Deposit with U.S. Postal Service **MARCH 26, 2002**. I hereby certify that this paper is being deposited with the United States Postal Service as first class mail under 37 CFR 1.8 on the date indicated above and is addressed to the Assistant Commissioner for Patents, Washington, D.C. 20231.

  
Shirley A. Langley

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Assistant Commissioner for Patents  
Washington, D.C. 20231

Sir:

**MARKED-UP COPY SHOWING CHANGES**  
**MADE IN RESPONSE TO FIRST OFFICE ACTION**

This is in response to the first Office Action of December 26, 2001 which indicated claims 13 and 21 would be allowable if placed in independent form and rejected the remaining claims over various combinations of the applied prior art references.

In response, please amend this application as follows:

## IN THE CLAIMS

Please amend claims 1, 7, 13, 14, 16, and 17-22 as follows:

### **1. (Amended)**

1           A carburetor, comprising:  
2           a metallic body having a fuel and air mixing passage through which [air flows  
3           and through which fuel] a fuel and air mixture is delivered to an engine;  
4           a throttle valve assembly [moveable] movable in the fuel and air mixing  
5           passage between [first and second] idle and wide open positions, said valve assembly having  
6           a polymeric shaft rotatable relative to the carburetor body[,];  
7           a separate polymeric cam body connected to the shaft for rotation in unison  
8           with the shaft; [and]  
9           a separate valve head in communication with the fuel and air mixing passage  
10          and carried by the shaft for rotation in unison with the shaft,  
11          the shaft being journalled for rotation in integral bores in one portion of the  
12          carburetor body;  
13          the cam body being configured to be connected to an actuator wire for  
14          movement of the shaft and valve head between the idle and wide open positions; and  
15          at least one stop carried by the body and engageable by the cam to limit  
16          rotation of the valve assembly to at least one of the idle position and wide open throttle  
17          positions of the valve head of the valve assembly.

**7. (Amended)**

1           The carburetor of claim [1] 2 wherein the [cam body is integrally formed  
2       with] elongate slot in the shaft has a length greater than the width of the portion of the valve  
3       head received in the slot and greater than the width of the mixing passage at the location  
4       where the shaft extends across the mixing passage.

**13. (Amended)**

1           [The carburetor of claim 8 wherein]

2           A carburetor, comprising:

3           a carburetor body having a fuel and air mixing passage through which air  
4       flows and through which fuel is delivered to an engine;

5           a valve assembly movable in the fuel and air mixing passage between first and  
6       second positions, said valve assembly having a polymeric shaft rotatable relative to the  
7       carburetor body;

8           a polymeric cam body connected to the shaft for rotation with the shaft;

9           a valve head in communication with the fuel and air mixing passage and  
10       carried by the shaft for rotation with the shaft; and

11          the shaft has a groove formed therein and the cam body has a [throughbore]  
12       bore and a tab extending into the [throughbore] bore with the tab constructed and arranged  
13       to be received in the groove when the cam body is fully received on the shaft.

#### 14. (Amended)

1 A throttle valve assembly for a carburetor [having] comprising:

2 a carburetor body with a fuel and air mixing passage[; the valve assembly  
3 comprising];

4 a throttle polymeric shaft rotatably carried by the carburetor body in  
5 communication with the fuel and air mixing passage and having a slot formed therethrough  
6 between its ends, the shaft also being axially movable relative to the mixing passage and the  
7 carburetor body;

8 a throttle cam body connected to the shaft for co-rotation in unison with the  
9 shaft [and having a pair of integral stops constructed and arranged] to engage [stops on] at  
10 least one stop carried by the carburetor body to limit rotation of the throttle valve assembly[,  
11 and];

12 a valve head carried by the shaft for rotation in unison with the shaft, in  
13 communication with the fuel and air mixing passage and disposed in part in the slot so that  
14 rotation of the shaft changes orientation of the valve head relative to the fuel and air mixing  
15 passage to control fluid flow through the fuel and air mixing passage; and

16 the length of the slot thorough the shaft being greater than the width of the  
17 portion of the valve head received in the slot of the shaft and greater than the width of the  
18 mixing passage at the location of the shaft in the mixing passage so that the shaft is movable  
19 axially relative to both the valve head and the mixing passage to center the valve head in the  
20 mixing passage.



**16. (Amended)**

1           The [carburetor] valve assembly of claim 14 wherein the valve head is  
2           generally circular and generally flat, and the slot has a length greater than the diameter of the  
3           valve head so that the valve head can shift within the slot generally axially relative to the  
4           shaft.

**17. (Amended)**

1           The [carburetor] valve assembly of claim [16] 14 wherein [the length of the  
2           slot is at least equal to the diameter of the fuel and air mixing passage with] the slot  
3           [spanning] spans the entire fuel and air mixing passage, the shaft is journalled for rotation  
4           at least in part beyond each end of the slot, a spring is received over the shaft between the  
5           cam body and the carburetor body, and a retainer is received on the shaft adjacent an end of  
6           the shaft distal from the cam body and adjacent the carburetor body.

**18. (Amended)**

1           The [carburetor] valve assembly of claim 14 wherein the shaft has a flat  
2           surface and the cam body has at least one shoulder which engages the flat surface of the shaft  
3           to prevent relative rotation between the shaft and cam body.

**19. (Amended)**

1           The [carburetor] valve assembly of claim 14 wherein the cam body is  
2           integrally formed with the shaft.

**20. (Amended)**

1                   The [carburetor] valve assembly of claim 14 wherein the cam body is pressed  
2                   onto the shaft and is retained on the shaft by an interference fit.

**21. (Amended)**

1                   The [carburetor] valve assembly of claim 20 wherein the shaft has a groove  
2                   formed therein and the cam body has a throughbore and a tab extending into the throughbore  
3                   with the tab constructed and arranged to be received in the groove when the cam body is fully  
4                   received on the shaft.

**22. (Amended)**

1                   The [carburetor] valve assembly of claim 14 wherein the shaft has a portion  
2                   with a non-circular cross-section constructed and arranged to be received in a complimentary  
3                   no-circular recess in the cam body to prevent relative rotation between the shaft and the cam  
4                   body.

**Please ADD the following claims 23-24:**

**23. (Added)**

1                   A valve assembly comprising:

2                   a carburetor body with a mixing passage, and a pair of co-axial bores on  
3                   opposite sides of the mixing passage and extending substantially transversely to the  
4                   longitudinal axis of the mixing passage;

5                   a polymeric valve shaft extending transversely through the mixing passage,  
6                   journalled for rotation in the bores, being axially movable relative to the mixing passage and  
7                   the carburetor body and having a slot therethrough between its ends;

8                   a valve head received in the mixing passage, disposed in the slot and carried  
9                   by the shaft for rotation in unison with the shaft so that rotation of the shaft changes the  
10                  orientation of the valve head relative to the mixing passage to control fluid flow through the  
11                  mixing passage; and

12                  the length of the slot through the shaft being greater than the width of the  
13                  portion of the valve head disposed in the slot of the shaft and greater than the width of the  
14                  mixing passage at the location of the shaft in the mixing passage so that the shaft is movable  
15                  axially relative to both the valve head and the mixing passage to center the valve head in the  
16                  mixing passage.

24. (Added)

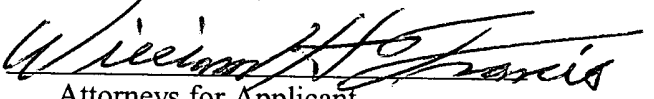
1           The valve assembly of claim 23 wherein the valve head also comprises at least  
2   two spaced-apart stops with at least one stop disposed on each of opposite sides of the shaft  
3   with the distance between the stops on opposed sides of the shaft being greater than the  
4   portion of the shaft received between the stops so that the stops limit the extent to which the  
5   valve head can move transversely to the shaft and the valve head can shift transversely to the  
6   axis of the shaft to center the valve head in the mixing passage when the shaft is rotated to  
7   cause the valve head to at least substantially close the mixing passage.

Respectfully submitted,

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Learman & McCulloch, P.C.

WHF:sal

By



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